

A secondary impact was the repricing of telecommunications services by BT. Historically, the pricing of telecommunications services in Britain was determined by BT. This was especially true when it was a monopoly and has changed little since privatization, largely because of BT's dominant position until now in the provision of universal, ubiquitous telephone service. Under a price cap regime imposed by Britain's telecommunications regulatory body, OFTEL, the prices of BT's services have come down somewhat, and it is now clear that the government wants to bring these prices down even further and faster by means of both regulatory and competitive incentives.

BT's pricing structure is complicated for Americans because it is not flat rate but usage sensitive, time sensitive, and distance sensitive. Calls are measured

Part 4 : EVOLUTION OF MOBILE TELECOMMUNICATIONS STANDARDS AND SPECTRUM ALLOCATION IN THE EUROPEAN COMMUNITY

Introduction

Mobile telephony in Britain cannot be considered in isolation because Britain is an integral part of the larger European Community, currently with 12 nations as members but others wishing to join in the not-too-distant future. The other 11 members of EC are : Belgium, Denmark, Germany, Greece, France, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain.

PCN in Britain is being developed along with EC-wide and international standards and spectrum allocations in mobile telecommunications. There are two major European technical standards -- Digital European Cordless Telephone (DECT) and Group Special Mobile (GSM). The two British PCN providers have adopted the GSM standard, which, like almost any standard in Europe, is subject to a great deal of controversy. Despite the sometimes bitter controversy surrounding the development and adoption of GSM, the British PCN operators are at least attempting to avoid the early chaos that surrounded the launch of CT2, where potential service providers adopted different equipment and technical standards thus, according to some experts, dooming CT2 to failure -- at least in Britain, where a common air interface was not uniformly adopted until recently, i.e., after the CT2 services had been launched and most failed. The development of DECT is an attempt to have cordless equipment conform to a standardized set of transmission standards, i.e., a common air interface, so that cordless telephony and CT2 can have a clear set of identifiable and uniformly applied standards. Often when a marketplace attempts to adopt standards they tend to differ, often widely, and thus leave the public confused as to which provider they should go with. As a result, competition is frustrated, not enhanced, because it is often too difficult for a user to switch from one service provider to another, without suffering major costs. From today's perspective, there is no indication that the U.S. will fall into this particular policy "prison". If competition is to be encouraged and preserved, there should be clear standards and inter-network operating agreements that render the competing networks "seamless".

Standards in the EC are set primarily by the European Technical Standards Institute (ETSI), which works closely with technical experts working for the EC in Brussels and the International Telecommunication Union (ITU) in Geneva. The EC's public policy goal is to establish uniform standards and uniform spectrum allocations in an attempt to create a European wide mobile telecommunications market, and even a worldwide mobile services market.

Mobile Standards in the EC : Proliferation and Confusion

Initially, it was widely believed in Europe that the British were deliberately sabotaging the creation of an EC-wide market for mobile telecommunications services and equipment. Although Britain was Europe's pioneer in the development of a mobile communications system, it may have to pay the price because mobile and cordless telecommunications services and equipment grew in a haphazard and chaotic environment. And, unlike some of its European neighbors, Britain did not manage the politics of standards very well.

In Britain, there are 26 million copper or fixed connections to the telecommunications network, and 2 million radio connections. The British say that this is the highest percentage of radio connections to the telecommunications infrastructure in the world, although there are some Scandinavian countries that come close and may even exceed Britain.

Britain and the U.S. are among the first to have launched successful cellular telephone systems, along with the Scandinavians. Technologically, the British cellular system is sophisticated. It initially adopted an analog Telecommunications Access Control System (TACS) that has now been upgraded to an Extended TACS or ETACS, which is an adaptation of both the U.S. standard Advanced Mobile Phone System (AMPS), developed by Bell Laboratories, and the Scandinavian standard. Under ETACS, the cellular network is able to track every standby portable instrument in a car or carried by a person so that delays due to congestion can be minimized. The British cellular carriers have had problems serving customers driving on the M25 road that circles London and have had to develop sophisticated ways to serve users and keep them relatively happy. Because of the unexpected explosive demand for cellular service in Britain, the carriers quickly ran out of spectrum. Therefore, small cell size, a high level of frequency reuse, and significant technical sophistication characterize analog cellular telephony in Britain. Clearly, this technological sophistication has associated costs, but the demand for service in Britain is such that the cellular carriers have been able to increase subscribership, revenues, and even profits. Recently, however, the British cellular carriers have begun to move toward digital technology, just like their American counterparts.

Following and/or because of the explosive growth of cellular telephony, CT2 initially attracted much attention in Britain. Indeed, CT2 is a British invention. Unfortunately, the British government erred in refusing to adopt and enforce a uniform set of standards for cordless telephone devices and the base stations with which they communicate. As a consequence, different providers of CT2 services built both equipment and base stations according to

different sets of standards. The public suffered because a customer who subscribed to one CT2 provider was using equipment that could not communicate with a base station owned by a competitive provider. Today, because Hutchison appears to be the sole survivor in what was originally designed by policymakers to be a highly competitive market, there is, by default, a single standard. The question remains : Has CT2 service been delayed and handicapped by standards squabbles for so long that it is now doomed to failure in Britain? Telepoint is still searching for a market and may begin to look for niches not just in the public payphone sector but also in an in-building environment, one that is clearly envisaged for it in the U.S. and elsewhere. Indeed, given an adequate amount of spectrum and/or the deployment of digital technology, cellular service providers in Britain and the U.S. could also provide in-building services of the kind envisaged by telepoint in Britain -- and the U.S.

Now comes PCN in Britain and, finally, the British companies that are planning to offer services some time in 1993 and beyond have decided to adopt the European-wide GSM standard. The question remains, however, is GSM a viable European-wide and worldwide standard for PCN if PCN wants to serve a mass market?

Other European countries, both within and outside the EC, have embraced Britain's love affair with mobile telephony and have often chosen to adopt conflicting standards and signaling protocols:

- Spain adopted ETACS with different frequencies and different interchange protocols.
- Germany developed C-NET (Cellular Network) with spectrum at 900 MHz, but used German specific protocols for set up, sustenance and clearing of calls. The German system is a hybrid of ETACS and Nordic Mobile Telephone (NMT).
- The Nordic countries have adopted NMT, a common specification for signaling protocols but the frequency assignments are compatible with each nation's spectrum plan, i.e., some have assigned spectrum at 450 MHz and others at 900 MHz. The NSM technology has been sold to the Netherlands, Belgium, and Switzerland, among others.
- France opted to go-it-alone and in the mid-1980s joined with MATRA in development of the System 2000, a ten-channel analog system. Many technical experts within the EC had disdain for the French system, which was announced at the time every other country was talking of a migration from analog to digital. System 2000 failed because it could not coexist with other

systems within Europe. Then the French began a basement-to-attic review of mobile telephony by developing a system that was designed to be all digital, robust, with hand offs in cells as small as 100 metres, plenty of channel capacity, and accomodating mobile users demanding a plethora of different services, both basic and enhanced. The French attempted to design a system with Integrated Services Digital Network (ISDN) sophistication over a wireless network.

In summary, until the onset of GSM, European mobile telecommunications policy resulted in the allocation of national specific radio channels and national specific signaling protocols that existed nowhere else. In other words, there was little, if any, coordination and this nationally specific policy development approach threatened to doom Europe to the status of a mobile services and technology backwater.

The Adoption of the GSM Standard : Toward Uniformity and Ubiquity

The EC was thrilled by the GSM concept and indicated that the French idea could propel the Europeans into the long-awaited information age by early in the 21st century. The EC spent a great deal of money on the development of GSM and, by doing so, GSM became the intellectual property of the EC. The French government was happy with this EC support and funding because the work on GSM was speeded up and someone else, i.e., the EC, was paying for its development.

GSM was quickly incorporated into the Conference of European Post and Telecommunications (CEPT) standardization work. CEPT is the club of Europe's PTTs (Post, Telegraph and Telephone entities), but is transferring its functions to ETSI in cooperation with the newly privatized telecommunications companies that are beginning to flourish in Europe. CEPT set up a technical committee to consider the GSM standard and, thanks to EC funding and research, the Europeans now believe that they have a sophisticated set of specifications that work. GSM has been tested by France Telecom, BT, Ericsson (an equipment manufacturer), and by the Japanese. When CEPT began to transfer its technical functions to ETSI in the late 1980s, a full-time GSM study group was established composed of people from various telecommunications companies. The GSM study group considered various issues relating to mobile telephony, for example spectrum, roaming,

interconnection with the German telecommunications infrastructure. In mobile services, the carriers use the same frequencies and the same interfaces. The only way a customer can differentiate between a D1 and D2 service provider is by choosing one and paying the monthly bill to the service provider of choice. D2 cellular stations handle D1 traffic and vice versa. Many experts describe the German system as brilliant because each operator receives revenues from increased use of the cellular system and both can collectively expand the infrastructure because each can use the other's resources. In other words, every time a new base station is activated, both share in its use. This may, at first glance, be an unsatisfactory solution for Americans because there is no direct competition between the two service providers. Indeed, there is just the opposite -- a large degree of cooperation. But the Germans insist that there is competition "at the edges", by which they mean the way in which customers are served, etc.

GSM differs from previous standards because it includes EC-wide frequency channels, the same protocols, the same way of digitizing speech, along with methods of cross-billing and revenue sharing. In this way, the EC is hoping to create for Europe cooperative competition as opposed to confrontational competition. In cooperative competition, the Europeans say everyone wins, while in confrontational competition you might see price wars resulting in destructive competition and the collapse of some of the companies leading to the dominance of others. Generally, many and probably most Europeans favor cooperative competition and believe that Americans favor confrontational competition.

DECT and GSM : Coexistence

GSM is designed to provide a ubiquitous macro mobile infrastructure. DECT is exactly the opposite; it is designed to provide wireless communications between a light hand-held cordless telephone and a base station that is only a few metres or yards from the communicating instrument, i.e., a micro network. DECT is differentiated by being a truly micro network standard. DECT is, however, designed to coexist with GSM, not compete with it. This

Summary

In the EC, three different technological and service concepts are being developed simultaneously:

1. For the person wandering around in a public place and wanting to make an easy and reliable outgoing call there is CT2 or Telepoint.
2. For the person who wants to move at a faster pace and over greater distances without being tethered to the public switched network there is the emerging European-wide mobile service based on the GSM standard. This is clearly an outgrowth of cellular telecommunications and, clearly, also includes PCNs. In essence, GSM is the latest generation of cellular or mobile telephony.
3. For those working in an office, government, factory, or industrial complex, where people move a lot and do not want to pay the expense of constantly having fixed telephones moved and rewired, there is the promise of the unwired or wireless building based on DECT. Clearly, DECT is closely related to CT2 but, because the developer of CT2, a British company, did not immediately cooperate with the EC, ETSI, and CEPT, CT2, for the time being, appears to have been hobbled in its early developmental stage. The British government is also partly to blame for the obstacles confronting CT2 because it refused to establish standards in cooperation with the ETSI and the EC.

Because the EC, through ETSI, is backing and promoting both GSM and DECT, they are likely to grow rapidly in spite of what critics claim as their shortcomings. If there are shortcomings, the EC and ETSI say that these problems will be rectified in the light of operational experience within the EC.

Part 5 : BRITISH BUSINESS STRATEGIES AND COMPETITIVE SCENARIOS IN MOBILE COMMUNICATIONS

Introduction

Everyone agrees that the British have assiduously attempted to introduce competition in the provision of mobile telecommunications services and equipment offerings. Almost everyone agrees that this policy has succeeded in part and has failed in part. Competition is not static; it is dynamic and ever changing. It is the unpredictable element in British competitive developments in mobile communications that is responsible for much of the policy failure.

Like Alice in Wonderland, British pro-competitive policies directed toward the mobile communications market is becoming "curiouser and curiouser". The major policy differences between cellular and PCN are capacity and standards. Cellular has limited capacity at 900 MHz and PCN has much more capacity at 1.8 GHz. Cellular was launched as an analog system and is just now beginning to consider a migration to the digital GSM standard, while both PCN carriers have decided to adopt the GSM standard from the outset. The British government, however, had little to do with the establishment of standards in cellular, Telepoint, or PCN, leaving the licensees to resolve standards issues either among themselves or with the help of the EC and ETSI.

Important questions about the actual and potential mobile market remain, along with what prices the public is prepared to pay, and how the implementation of four major mobile telecommunications networks will affect BT's public switched telecommunications network, which is itself feeling the pressures of increasing competition from Mercury and the cable TV carriers.

The Mobile Market?

No-one really knows what the potential market is for mobile telecommunications services in Britain. As in most market forecasts, there are the optimists and the pessimists. The optimists claim that both cellular and PCN can thrive in Britain and can serve between 8 and 10 million customers by the year 2000. The pessimists dispute these rosy forecasts saying that the market potential is only 3 to 5 million. Since approximately 1.4 million cellular customers are currently being served in Britain, this suggests that the mobile market will, at a minimum, double in size between now and the year 2000, and, at a maximum, increase six-to-sevenfold. Meanwhile

some experts at BT are afraid that the market potential for mobile communications services may be so great that the fixed line public switched network may be replaced. This is clearly a worst case scenario for BT, but even if mobile communications customers increase from 1.4 million today to between 5 and 8 million by the year 2000 it could have serious effects on the business prospects and profitability of BT. It will also have major public policy ramifications, especially if those who are left on the fixed network are the poorest members of British society.

In general, it appears that the two cellular telecommunications providers may be restricted to selling service to a restricted market, an elite business market with minimal price resistance, primarily because of spectrum restrictions. The two cellular carriers in Britain, however, claim that capacity problems may be resolved by a migration from analog to digital, which is already underway, and by the implementation of microcells. If microcells and digital technology are adopted by Cellnet and Vodaphone, and both carriers say that they will be, then there may be little, if any difference between cellular and PCN. PCN, however, has an opportunity to grab 50 MHz of spectrum for each provider, and is claiming that PCN services will be offered to a mass market from the start. If this claim is true, it suggests that the two current PCN carriers may have to offer extremely low prices in order to attract millions of new users of mobile services. If this mass marketing strategy is followed, then the question is how will the two systems recoup their enormous startup costs and return a profit over a seven-to-ten year period? The same problem may afflict the companies that enter the U.S. PCN market.

The Incumbent Cellular Carriers

In 1985, the British government awarded cellular radio communications licenses to two national operators, Cellnet (a subsidiary of BT with a minority ownership by Securicor) and Vodaphone (Racal Electronics). Spectrum was allocated at 900 MHz for the provision of cellular service. Today both cellular operators are regarded as highly successful and profitable, even though both spent approximately \$1 billion on constructing their separate nationwide networks. Currently, there are approximately 1.4 million subscribers on the two cellular systems, divided among corporate and business clients (96%) and individuals (4%).

implementing microcells; they are improving service quality; and are adopting new pricing techniques designed to appeal to the so-called low volume user of cellular services.

Both Cellnet and Vodafone have joined in the European development of GSM at 900 MHz so that they can provide inter-system roaming across Europe. Unfortunately, the price of handsets for GSM service is expected to be high -- at least for some time -- because subscribership to the pan-European service is expected to be extremely low until such time as equipment and service prices are reduced. Additionally, it is believed that the initial demand for the GSM service will be from the major multinational and international corporations within the EC. Since these large business users will have to migrate from the current ETACS, some analog capacity will be freed up for new cellular customers.

In summary, service pricing for cellular telecommunications is high in Britain but recent trends indicate that prices will fall somewhat, in part because of slow current growth rates and in part because of the fear of impending competition from the PCN carriers.

The Challengers

There are two PCN challengers to the two cellular incumbents. The two are:

- Microtel (now owned by Hutchison Telecom)
- Mercury-Unitel

There is, presumably, a third license now lying vacant because of the merger of Mercury and Unitel into one licensed provider.

Each of the two PCN providers must implement nationwide coverage over an eight year period and, if they do, will be given 50 MHz of spectrum each in the 1.8 GHz range. Both Microtel-Hutchison and Mercury-Unitel are focusing

Vodafone, neither of which intends to roll over and play dead while the challengers enter the mobile services arena and take away market share.

The critical question is can four (or perhaps five) national cellular providers survive in Britain? As of today, the answer is unclear. Britain's potential PCN operators take comfort in a simulated PCN trial. The purpose was to look at pricing plans, service, and attitudes. A major finding in the research was that, having used a simulated service, attitudes toward the idea of having a portable phone changed dramatically. Before the trial, only 11% of the consumers said that they would subscribe to a PCN service. Three months later the percentage jumped to 57. In addition, the research found that portable phone usage increased by an average of 70 minutes a month, all accounted for by the use of the PCN phone. Residential usage of the fixed line dropped by 30 minutes a month. Finally, 34% of PCN usage was for calls actually made and received at home.

As far as the consumer is concerned, however, price is the major determinant

deliberate attempt to fend off the marketing challenge from PCN. This is regarded as the first shot in what could become a hot war as we move into the mid-1990s.

Cable TV : A Help or a Hindrance to PCN?

As we have seen, cable TV, which is new in Britain and may itself be facing an uncertain future, has the potential to both help and hurt the development of PCN. Because the cable TV companies have been given the British government's blessing to offer telephone services they are potential competitors to the PCN operators, and thus could take part in a price war for telephone customers in the not-too-distant future. On the other hand, the cable TV operators could ally themselves with the PCN operators, as one, US West, already has, and eventually take up the third PCN license, which was vacated when Mercury and Unitel merged.

Telepoint?

Telepoint, like PCN, is, as yet, untested in the marketplace and may take some time to recover from the public policy obstacles, both from a marketing and technical perspective, that have been placed upon it. Nonetheless, as was seen earlier, telepoint-CT2 could develop niche markets for itself once it is launched, is more fully operational, and the recession ends.

BT : The Sleeping Giant

Will cellular telecommunications and PCN ever replace the fixed lines of the public switched network over which BT has almost total control? This is a question that is being asked in Britain, both inside and out of BT. If the answer is "yes", then BT is in trouble right now and must prepare rapidly for the transition. But even if the answer is "no", then BT must change in order to meet the competitive challenges that are inevitable, not only from the emerging cellular and PCN competitors, but also from cable TV companies and others.

BT claims that it is severely handicapped by regulators and craves the business, marketing, and pricing flexibility of its emerging competitors. If BT is unleashed from the regulatory constraints currently placed upon it by DTI and OFTEL it could be a fierce competitor in all service areas -- fixed, mobile, and cable TV. Currently, BT is precluded from entering the cable TV business -- a public policy almost identical to the one imposed upon the Regional Bell Operating Companies (RBOCs) in the U.S. -- and must have an arm's length relationship with its cellular subsidiary, Cellnet.

BT executives clearly believe that competitive developments, particularly in the PCN and cable TV areas, threaten its future viability and the company is therefore pressing the government to give it the pricing and business flexibility that it has been demanding, without much success, for some time. BT executives say that price caps do not give it the pricing flexibility that it needs because it often needs to respond dramatically and immediately to new service offerings and new prices offered by its competitors.

There are those at BT who say that the future looks bleak if the competition is to be encouraged while BT remains subject to severe regulatory restrictions. But it is extremely unlikely that the British government will preside over the decline and fall of the nation's dominant telecommunications service provider. The British government still owns a significant minority position in BT, although plans to sell the remaining government stake are well underway.

Summary

There are many business uncertainties concerning the future of the British market for mobile communications services in general and PCN in particular. PCN's success or failure depends, in part, on:

- How price competition develops and what the British government's reaction to it is.
- How many PCN operators there are, and the degree of operating and business flexibility given them by the British government.
- The effectiveness of the PCN companies in developing a new market for their "new" service offerings. Currently, PCN appears to be merely a re-packaging of existing cellular services.
- The reaction of the mass market, both business and residential, to the new service offerings.
- The reaction of BT when, and if, it begins to focus on the competitive threat from mass marketed mobile communications service that may imperil the future of the fixed line system owned and controlled by BT.
- Whether or not the British government begins to foster a new age of collaborative competition as opposed to the aggressive competitive policies that have been promoted thus far. Under conditions of collaborative competition, many of the existing competitors could merge, form joint

ventures, or merely establish a cooperative club to operate the various networks that serve the British public.

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Bill Adler, Pacific Telesis
Steve Andrews, US West, London
Jim Van Artsdalen, RAM Mobile Systems
Ira Baron, BellCore
Ed Belcher, CSC-Intelicom, London
Peter Berrie, British Telecom
George Billings, Mobile Management Corporation
Dr. Robert Blau, BellSouth
Professor Michael Botein, New York Law School
George Brody, BNR, Canada
Jim Caile, Motorola
Mike Caldwell, Vodaphone, England
Dr. Sorin Cohn, Northern Telecom
Ron Cross, Northern Telecom
Parke Davis, Department of Communications, Government of Canada
Elliott Derk BellCore
Matt Desch, Northern Telecom
Jim Downey, National Engineering Consortium
Lynne Gallagher, Sprint
Simon Glynn, ADL, London
Joel Gross, Donaldson, Lufkin, Jenrette
Clark Hand, LCC Incorporated
Robert Hargreaves, Independent TV Authority, England
Alan Harper, Mercury Personal Communications, England
Ernest Jones, GPT, England
Brian Kidney, Pacific Telesis
Gil LaVean, IMM
Andy Lipman, Esq., Swidler and Berlin
Peter MacLaren, Northern Telecom Wireless Systems
John Mahoney, British Broadcasting Corporation
John Major, Motorola
Dean Martineau, Northern Telecom

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